



Owner's Manual

Model 2351 System Expansion Boards

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Use this manual with the following models only.

Tracker expansion boards 2351-010 Rev E or higher.

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Section 1 – Setup

The model 2351 Tracker Expansion Board allows you to expand the number of entry points that the models 1803PC, 1815, 1817, 1818, 1833, 1835, 1837 and 1838 PC Programmable Entry Systems can control up to a maximum of 16. One Tracker board is required for each entry point. Tracker boards will interface with a variety of weigand devices including card readers, RF transmitters, digital keypads, etc. Tracker will also report gate operator data from DKS intelligent gate operators that have Gate Tracker outputs. In addition to these features, Tracker can also monitor the status of a door, report door ajar and forced entry conditions, sound local alarms, activate a building alarm system, and has request to exit inputs.

1.1 General Information

- Expands the control capability of selected DKS entry systems to allow control for up to 16 entry points.
- Provides power and inputs for almost any 26-bit weigand device. May power two readers in parallel if required. For example: an entry and exit card reader on a single door.
- Can be used to provide a variety of door monitoring functions, such as sounding an alarm, or activating a building alarm system when the door is forced or held open.
- Provides a request to exit input.
- Provides three relay outputs to control the door (or gate), alarm system activation, and local alarm activation.
- Hold Open Feature unlocks individual doors (or holds open individual gates) when commanded from the entry system software.
- Monitors transactions from DKS intelligent gate operators. Can monitor slide or swing gate operators and the parking gate operator in PAMS type applications.

To utilize the full capability of the Tracker expansion board(s), the DoorKing Remote Account Manager for Windows software, V 5.3 or higher is required to be installed on the user supplied PC. The chart below is to assist you in determining if you have the proper access equipment and gate operators to utilize the full capability of the Tracker expansion board. For additional information on system capabilities and software program features, refer to the individual entry system manuals, and the Remote Account Manager for Windows User's Manual.

Access Control Systems				Gate Operators with Tracker Reporting Capability	
Model	Control Board	Max Tracker Boards	Hold Open Feature	Model	Control Board
1815, 1817, 1818	1852 through 1857	8 for 1815, 1817 16 for 1818	No	1601, 1602	1601, REV Q and Higher
1815, 1817, 1818	1840, 1841, 1842 REV A, B	8 for 1815, 1817 16 for 1818	No	1150, 9200, 9300 9210, 9310	4402 4403
1815, 1817, 1818	1840, 1841, 1842 REV C	16	No	601, 602, 605, 610, 615, 620 625, 630	4501, REV R and Higher
1815, 1817, 1818	1840, 1841, 1842 REV D, E	16	Yes	601, 602 6050, 6100, 6300	4502
1803PC	1844 REV A	16	Yes	1100, 910, 915, 920	4601, REV J and Higher
1833, 1835, 1837, 1838	183x Series	16	Yes	9100, 9150	4602

1.2 Tracker Board Input/Output Descriptions

1.2.1 Access Control Device (Weigand) Input

Tracker boards can accept weigand input data from most devices that output their data in a 26-bit weigand format. An access control device (a card reader for example) is connected to the tracker board at P2, terminals 6-7-8-9. When the tracker board receives the weigand data from the access device, it sends the data to the access system controller where the decision to grant or deny access is made. At the same time, a report is made of this activity and is stored in the transaction buffer.

Two access control devices may be connected to a single tracker board, however each device will report the same location in the transaction report when connected in this method and each device will activate the same door (or gate). This may be preferable in some instances. For example, if a vehicular gate uses both a card reader and an RF receiver for resident access, each of these devices can be connected in parallel. Each device will activate the gate (door) that the output relay of the tracker board is connected to, and each device will appear in the transaction report with the name assigned to the tracker board in the software ("Main Gate", for example).

1.2.2 Gate Operator Data Input

Gate operator data inputs can only be used with DKS vehicular gate operators (see chart on page 6). The tracker board receives data (P2, terminals 1-2-3-4-5) from the gate operator control board, converts it to weigand format, and then sends this weigand data to the access system controller where it is stored in the transaction buffer. The data that is sent from the gate operator control board includes information such as gate operator cycle count (x100), if an obstruction was hit, if an attempt was made to force the gate, etc. See the appendix for a complete listing of all gate operator transactions. In PAMS applications, only one tracker board is required per traffic lane to monitor the gate operator activity of the slide or swing gate operator, and the parking gate operator. The tracker board will also monitor the 24 VAC power from the gate operator control board(s). When this power is removed, a "power out" transaction is sent to the access system.

1.2.3 Request to Exit Input

An alarm condition will exist anytime a controlled door is opened without access being granted by the access control system. The request to exit input (P2, terminals 8 & 18) allows the door to be opened without activating the tracker board alarm relays, and will not cause the access system to report a forced condition. The request to exit is typically used at a controlled access point to allow free exit to personnel. A "Push To Open" button, or a push bar, etc., is connected to the request to exit input on the tracker board. When this input is activated, the tracker board output relay will activate causing the door strike or magnetic lock to release allowing the door to be opened.

1.2.4 Door Ajar Input

The door ajar input (P2, terminals 8 & 15) monitors the status of a controlled access door through a magnetic (typical) door switch. This input tells the tracker board if the door is not fully closed, and will cause the alarm and monitor relays on the tracker board to activate under certain conditions (see Section 1.3).

1.2.5 Reset Alarm Input

The reset alarm input (P2, terminals 8 & 16) overrides the door ajar input allowing a door to held open when necessary. When this input is activated, the tracker board will not activate its alarm or monitor relays even if the door ajar input is activated. The reset alarm input is active in Mode-1 operation only (see 1.3.1).

1.2.6 Command Relay Input

The command relay input (P2, terminals 8 & 17) is connected to the relay in the access system controller that activates when a valid device code is received by the controller. For example, when a card reader connected to the weigand input on the tracker board reads the card code, it inputs this information to the tracker board, which in turn sends the information to the access system controller. The access controller then makes the decision to grant or deny access. If access is denied, a transaction of the denial is made and nothing else happens. If access is granted, a transaction of the access grant is made, and the controller activates the command relay. This relay output is connected to the tracker board system command relay input, which then causes the tracker board output relay to activate. The output relay activation will then open the controlled door (or gate). If two or more tracker boards are connected to the access system, only the output relay on the tracker board that sent the data will activate. The tracker board relay strike time is set via the programming switches on the tracker board.

1.2.7 Monitor and Alarm Relays

Activation and operation of the monitor (P1, terminals 1-2) and alarm (P1, terminals 3-4) relays is dependent on the mode of operation (switch 1) and on the settings of switches 3 and 4 on the tracker board (see Section 1.3). Typically, the monitor relay is connected to a local alarm (bell, buzzer, light, etc.) and the alarm relay is connected to the buildings alarm system. These relays provide a dry contact only.

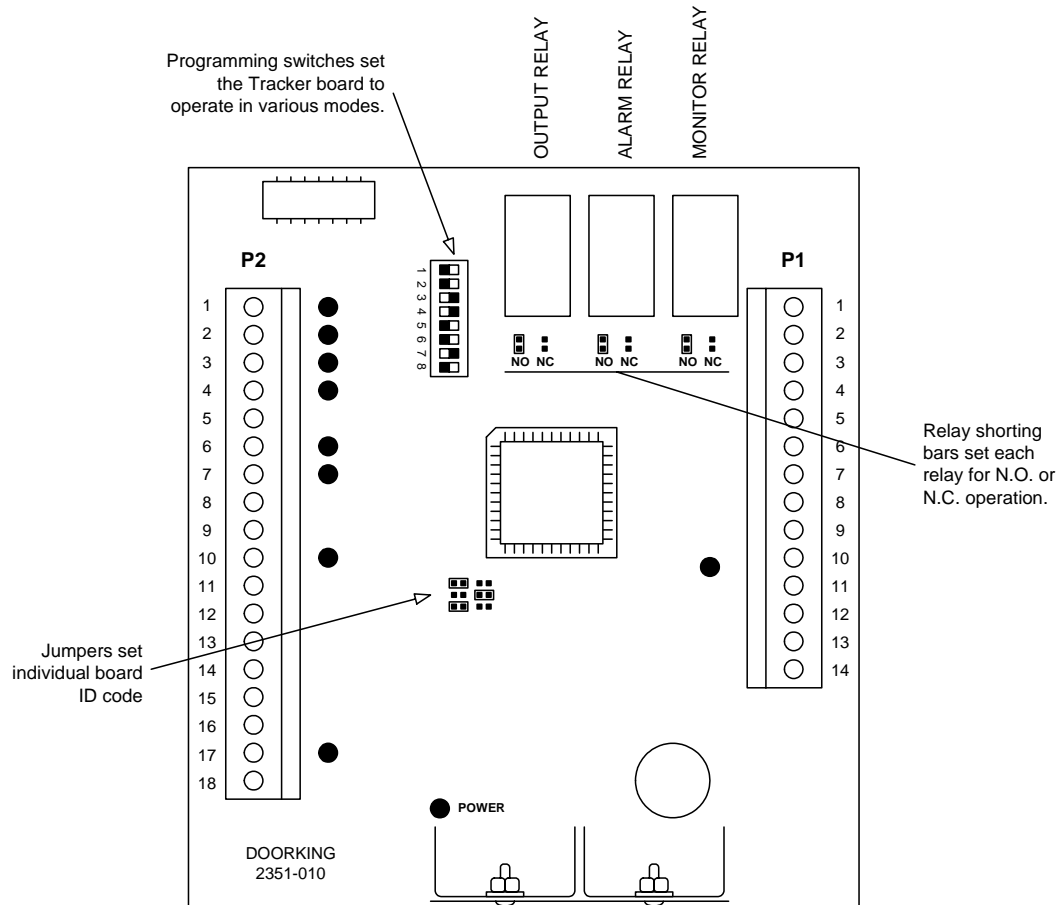
1.2.8 Output Relay

The output relay (P1, terminals 5-6) activates on command from the access control system, or from a request to exit input. The output relay releases the door strike (or magnetic lock) to allow entry or exit, or activates a gate operator if the tracker board is used to control a vehicular gate.

1.2.9 Weigand Output

All data received at the weigand input terminals and the gate tracker terminals is sent to the access control system in 26-bit weigand format from the weigand output terminals (p1, terminals 7-8-9).

2351-010 Board Settings



DOORKING, INC., INGLEWOOD, CA 90301		
Title: 2351-010 Board Settings		
Date: 4/02	Dwg. No. M2351-065-A1	Rev. A

1.3 Monitor and Alarm Relay Operation

The Tracker board provides relay contacts for monitoring and alarm purposes. There are two different modes in which the tracker board can be programmed to operate; **MODE-1** and **MODE-2**. These different modes of operation are set by switch 1 and determine the operation of the MONITOR (R1) and ALARM (R2) relays on the tracker board. The mode of operation does not affect the OUTPUT (R3) relay. This relay (R3) is only activated on command from the access system or from the request to exit input on the tracker board.

1.3.1 Mode-1

In mode 1 (switch 1 OFF), the monitor relay is typically connected to a local alarm (bell, buzzer, light, etc.) and the alarm relay is typically connected to the buildings alarm system or can activate some other device (an auto-dialer for example) that will alert the proper personnel or authorities. A door ajar switch (not supplied) is required to monitor the status of the door.

OPERATION MODE 1

When the access system has granted access, the output relay on the tracker board activates for its programmed strike time (switches 7 & 8) and unlocks the door. If the door is still open (door ajar switch closed) when the output relay deactivates, the door ajar timer starts. If the door has not closed by the end of this time period (settable by switches 5 & 6), the alarm relay activates for 1 second and the monitor relay activates for a time period settable by switches 3 & 4. At the same time, a door ajar transaction is sent to the access system. When the door finally closes, a transaction is sent to the access system and the system resets. If the reset alarm switch is activated, nothing happens. This allows a door to be propped open when necessary. It is important to note that an alarm condition will exist anytime the door is opened without having been activated by the output relay on the tracker board. Because of this, any device other than the access system, that is used to grant access through the door must be connected to the FREE EXIT input on the tracker board and not connected directly to the door strike itself.

EXAMPLE: Assume the tracker board controls an entry door. The output relay strike time is set for 5 seconds, the door ajar timer is set for 30 seconds, and the monitor relay strike time is set for 1 minute. When access is granted, the output relay will activate for 5 seconds. After 5 seconds, the door ajar timer will start if the door ajar switch is still closed (door still open). An alarm condition will exist if this door remains open for more than 30 seconds. At this time, the alarm relay will activate for 1 second only, and the monitor relay will activate for its programmed strike time of 1 minute.

MODE-1 OPERATION SWITCH SETTINGS				
Switch	Description	Setting		Function
1	Mode	OFF		Sets board to operate in MODE-1 condition.
2	Spare	OFF		Not used in MODE-1 operation. Leave OFF.
3 & 4	Monitor relay strike time	<u>3</u> ON OFF ON OFF	<u>4</u> ON ON OFF OFF	Monitor relay strike time after alarm condition occurs. 1 Minute 4 Minutes 8 Minutes Continuous until door ajar condition clears.
5 & 6	Door ajar timer	<u>5</u> ON OFF ON OFF	<u>6</u> ON ON OFF OFF	Door ajar condition must be true before alarm condition occurs. 30 Seconds 1 Minute 3 Minutes 5 Minutes
7 & 8	Output relay strike time	<u>7</u> ON OFF ON OFF	<u>8</u> ON ON OFF OFF	Output relay strike time after access is granted. 1 Second 3 Seconds 5 Seconds 30 Seconds

1.3.2 Mode-2

In MODE-2 (switch 1 ON), the monitor relay is typically connected to a local alarm (bell, buzzer, light, etc.) and the alarm relay is typically connected to the buildings alarm system. In this mode, there are two distinct conditions under which the tracker board will respond to a door ajar condition; FORCED CONDITION and PROPER CONDITION.

FORCED CONDITION - The access system or request to exit device has not activated the door strike (output relay not activated) but the door ajar contact (door ajar switch closes) indicates that the door has been opened. In a forced condition, both the monitor relay and alarm relay will activate whenever the door ajar switch is closed, and will deactivate when the door ajar switch opens. Note that a forced condition can only occur if the access system or request to exit device has not activated the door strike, otherwise a proper condition occurs.

PROPER CONDITION - The access system or request to exit device has activated the door strike (output relay activated), but the door has not closed (door ajar switch closed) by the end of the strike time. In a proper condition, the monitor relay will go on and off at 1-second intervals until the door closes (door ajar switch opens), or until the door ajar timer (switches 5 & 6) runs out. Five seconds prior to the door ajar timer running out, the monitor relay will stay on, and then deactivate. When the door ajar timer runs out, the alarm relay may or may not activate depending on the setting of switches 3 & 4. If the alarm relay does activate (switches 3 & 4 off), it will remain activated until the door closes (door ajar switch opens).

MODE-2 OPERATION SWITCH SETTINGS				
Switch	Description	Setting		Function
1	Mode	ON		Sets board to operate in MODE-2 condition.
2	Spare	OFF		Not used in MODE-2 operation. Leave OFF.
3 & 4	Condition (See combinations below and chart on next page)	3 OFF OFF ON ON	4 OFF ON OFF ON	Sets tracker board for the following conditions. 1 - Forced & Proper conditions enabled. 2 - Forced condition only enabled. 3 - Proper condition only enabled. 4 - Forced & Proper conditions enabled.
5 & 6	Door ajar timer	5 ON OFF ON OFF	6 ON ON OFF OFF	How long monitor relay activates after a door ajar condition exist. 30 Seconds 1 Minute 3 Minutes 5 Minutes
7 & 8	Output relay strike time	7 ON OFF ON OFF	8 ON ON OFF OFF	Output relay strike time after access is granted. 1 Second 3 Seconds 5 Seconds 30 Seconds

In MODE-2, the setting of switches 3 & 4 will determine which conditions (proper, forced) the tracker board will respond to, and how the monitor and alarm relays will respond under a proper condition (see chart on next page).

CONDITION COMBINATIONS

1. **Forced** and **Proper** condition enabled (Switch 3 OFF - Switch 4 OFF). Monitor and Alarm relay respond to a **Proper** condition.
2. **Forced** condition only enabled (Switch 3 OFF - Switch 4 ON). Monitor and Alarm relays respond.
3. **Proper** condition only enabled (Switch 3 ON - Switch 4 OFF). Monitor relay only responds.
4. **Forced** and **Proper** condition enabled (Switch 3 ON - Switch 4 ON). Monitor relay only responds to a **Proper** condition.

	SWITCHES		MONITOR RELAY		ALARM RELAY	
	3	4	Forced Condition	Proper Condition	Forced Condition	Proper Condition
A	OFF	OFF	Activates whenever door ajar switch closes (door open).	Turns on-off in 1-second intervals for length of time determined by switches 5&6.	Activates whenever door ajar switch closes (door open).	Turns on after door ajar timer expires.
B	OFF	ON	Activates whenever door ajar switch closes (door open).	Proper condition disabled.	Activates whenever door ajar switch closes (door open).	Proper condition disabled.
C	ON	OFF	Forced condition disabled.	Turns on-off in 1-second intervals for length of time determined by switches 5&6.	Forced condition disabled.	Alarm relay function for proper condition disabled.
D	ON	ON	Activates whenever door ajar switch closes (door open).	Turns on-off in 1-second intervals for length of time determined by switches 5&6.	Activates whenever door ajar switch closes (door open).	Alarm relay function for proper condition disabled.

OPERATION MODE - 2

When the access system or request to exit device has granted access, the output relay on the tracker board activates for it's programmed strike time (switches 7 & 8) and unlocks the door. If the door has not closed when the output relay deactivates, the monitor relay will turn on-off in one second intervals for a length of time determined by the door ajar timer (switches 5 & 6) if the proper condition is enabled (switches 3 & 4). The monitor relay will continue to turn on-off in one second intervals until the door closes (door ajar switch opens). If the door remains open (door ajar switch closed), then five seconds prior to the door ajar timer expiring, the monitor relay will turn on and remain on until the door ajar timer expires. At this time, a transaction is sent to the access system. The alarm relay will turn on after the door ajar timer expires only if switches 3 & 4 are off, otherwise the alarm relay will not activate. When the alarm relay does turn on, it will remain on until the door closes (door ajar switch open). A transaction is sent to the access system when the door closes.

It is important to note that a forced condition will exist anytime the door is opened without having been activated by the output relay on the tracker board, unless the forced condition is disabled (switch 3 on, switch 4 off). Because of this, request to exit devices that are used to unlock the door when the forced condition is enabled, must be connected to the REQUEST to EXIT input on the tracker board and not connected directly to the door strike itself. This also applies when telephone entry systems (1803PC, 1815, 1817, 1833, 1835 or 1837) are used to grant visitors access. The relay that is programmed to activate when the resident grants their guest access (pushes 9) should be connected to the REQUEST to EXIT input on the tracker board and not directly to the door strike, otherwise the system will assume that a forced entry has occurred.

In mode-2 operation, the reset alarm switch does not affect the operation of the monitor or alarm relays.

NOTE -Request to exit inputs to the tracker board do not send a transaction to the access system.

1.4 Hold Open Features

There are two hold open features associated with the Tracker expansion boards: hold open time zones and an override hold open command. An "Override Hold Open" command will cause ALL the tracker boards connected to the access control system to open a gate or unlock a door, and remain in this status until commanded to return to normal operation.

1.4.1 Hold Open Time Zones

Hold open time zones are programmed in the Remote Account Manager for Windows (V 5.0 or higher only) software and cannot be administered from the access control system itself. Hold open time zones can be applied individually to the tracker boards as required to hold open a gate or to unlock a door during certain times of the day and certain days of the week.

Access control systems models 1803PC, 1815, 1817 or 1818 must be equipped with an Enhanced 40 Series (Rev D or higher) control board and the Tracker board must also have revision level D or higher for hold open time zones to be operable.

All "30 Series" access control systems, models 1833, 1835, 1837 and 1838, have hold open time zone capability.

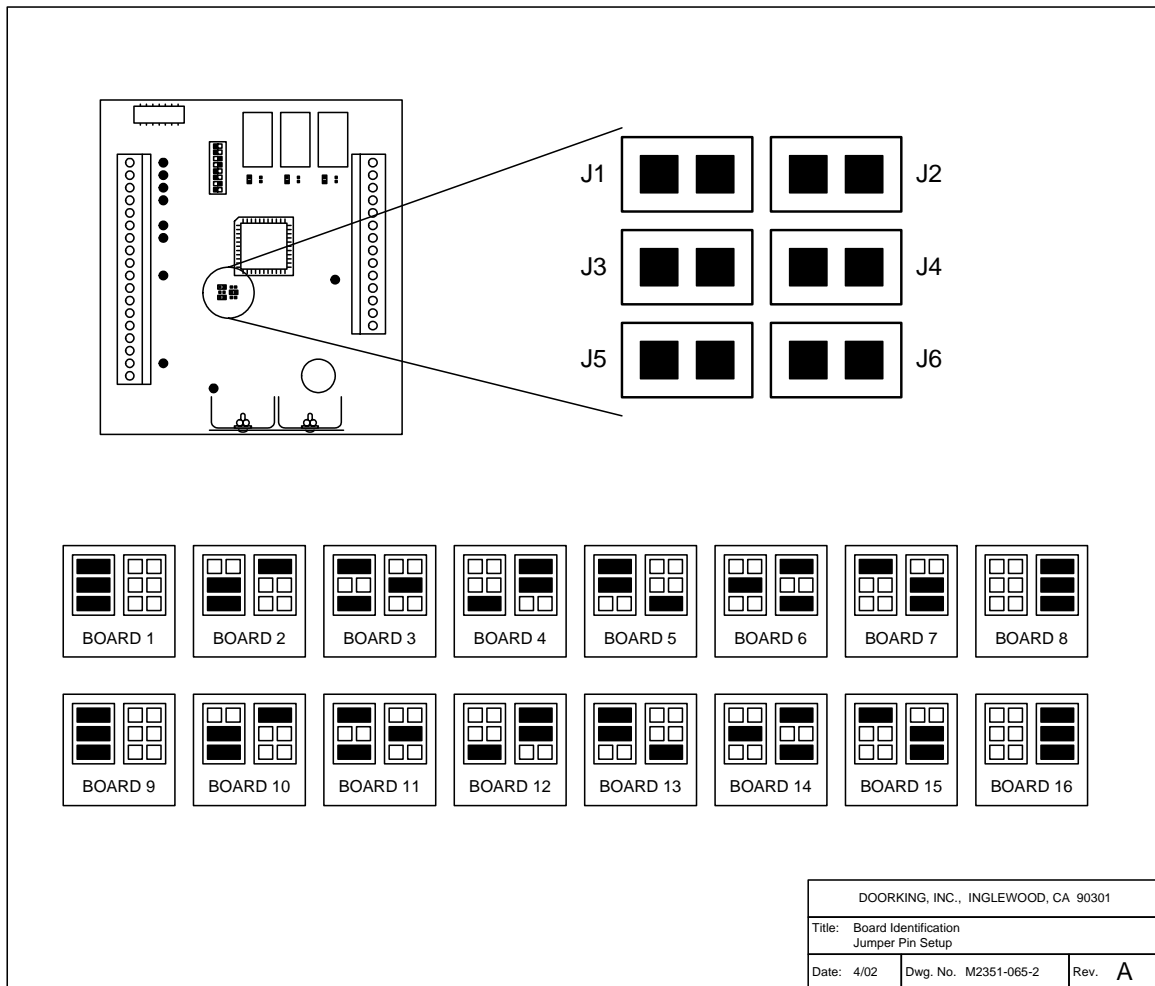
1.4.2 Hold Open Override

The tracker board is designed to activate its output relay and keep it activated (and therefore unlocking the door or gate) if the access system command relay is activated for 15 seconds or more. This feature enables the tracker boards to hold open their respective door or gate when necessary. It is important to realize that if the command relay in the access system is activated for 15 seconds or longer, ALL the tracker boards connected to that relay will unlock and hold open their respective door or gate while the relay is activated. The tracker board relay will deactivate after the access system relay deactivates.

1.5 Board and Relay Identification

When using two or more Tracker boards connected to a single access system, the board jumpers on each tracker board must be set so that the access system can identify each tracker board. There are six sets of jumper pins on the tracker board labeled J1 through J6. Shorting bars placed on the jumper pins create a unique address for each tracker board to identify itself to the access control system.

1.5.1 Board Identification



1.5.2 Relay Identification

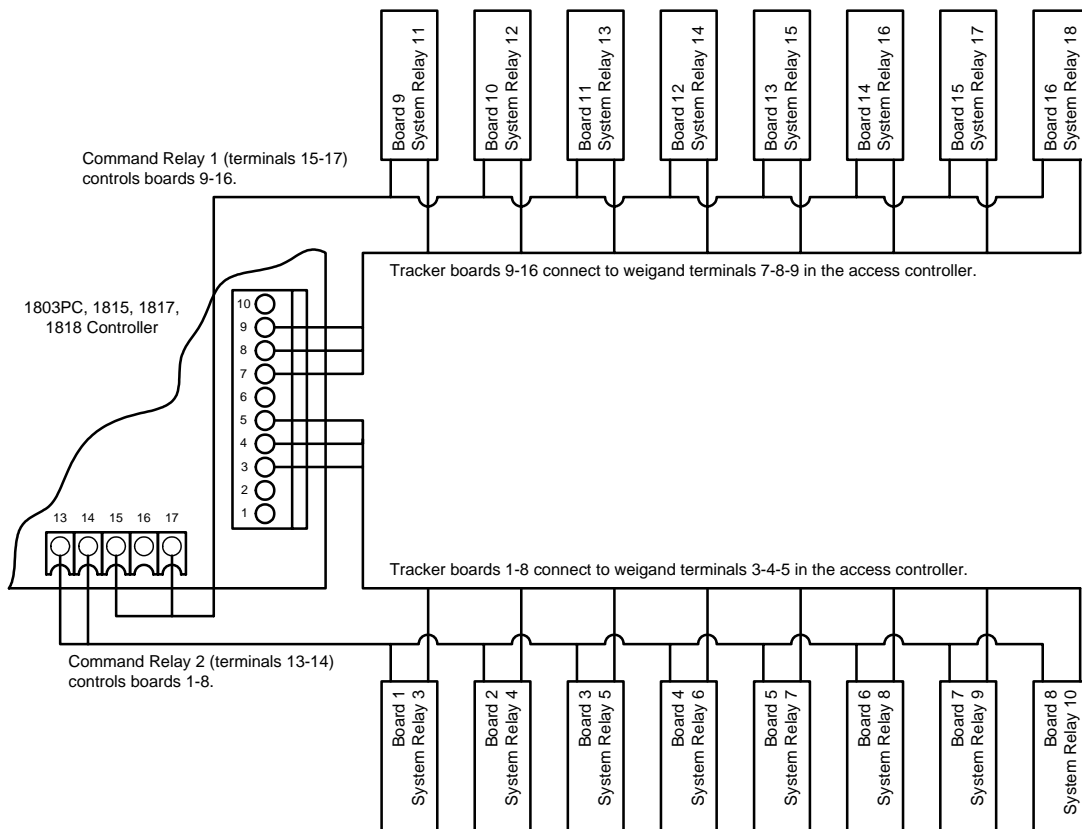
The models 1803PC, 1815, 1817, 1833, 1835 and 1837 telephone entry systems each have three relays (Relay 0, 1, and 2) on the control board while the 1818 and 1838 access control systems each have two (Relay 1, 2) relays. When Tracker boards are added to these systems, the output relay on the Tracker boards are listed in the software sequentially, beginning with Relay 3 (Relays 0, 1 and 2 are on the main control board). Each of the relays on the tracker board can be set to either Normally Open (NO) or Normally Closed (NC) by setting the relay shorting pin to the desired configuration.

When Tracker boards are used to expand the access control system, Relays 1 and 2 on the access control system circuit board are used as Tracker Command (Cmd) relays with Relay 2 commanding Tracker boards 1-8 (system relays 3-10) and Relay 1 commanding Tracker boards 9-16 (system relays 11-18).

1803PC, 1815, 1817, 1833, 1835 and 1837 SYSTEMS ONLY

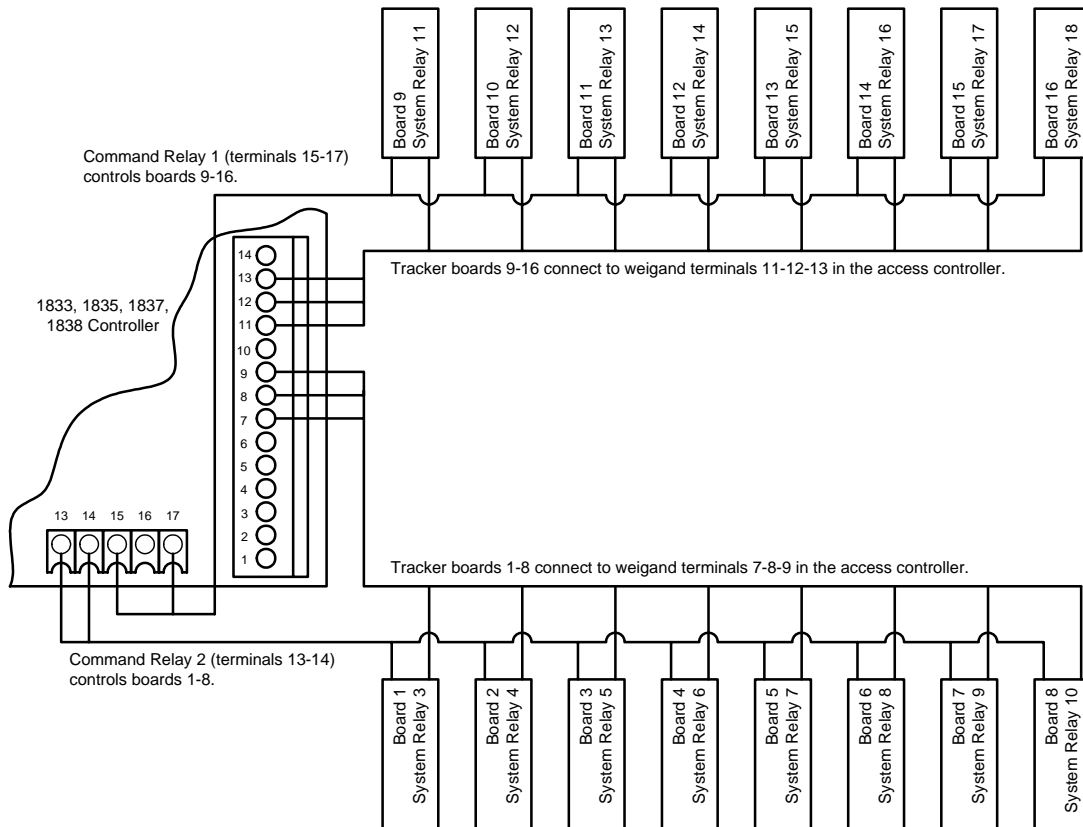
If both Relay 1 and Relay 2 are used to control Tracker boards, Relay 0 is used as the Primary Relay that will open a visitor door or gate when the resident pushes "9" on their telephone. The 1818 and 1838 systems do not have Relay 0 because these systems do not provide any communication for visitor entry.

Board and Relay Identification for 40 or 50 Series Controller



DOORKING, INC., INGLEWOOD, CA 90301			
Title: Board and Relay Identification for 40 or 50 Series Controller			
Date: 3/03	Dwg. No. M2351-065-3	Rev. B	

Board and Relay Identification for 30 Series Controller



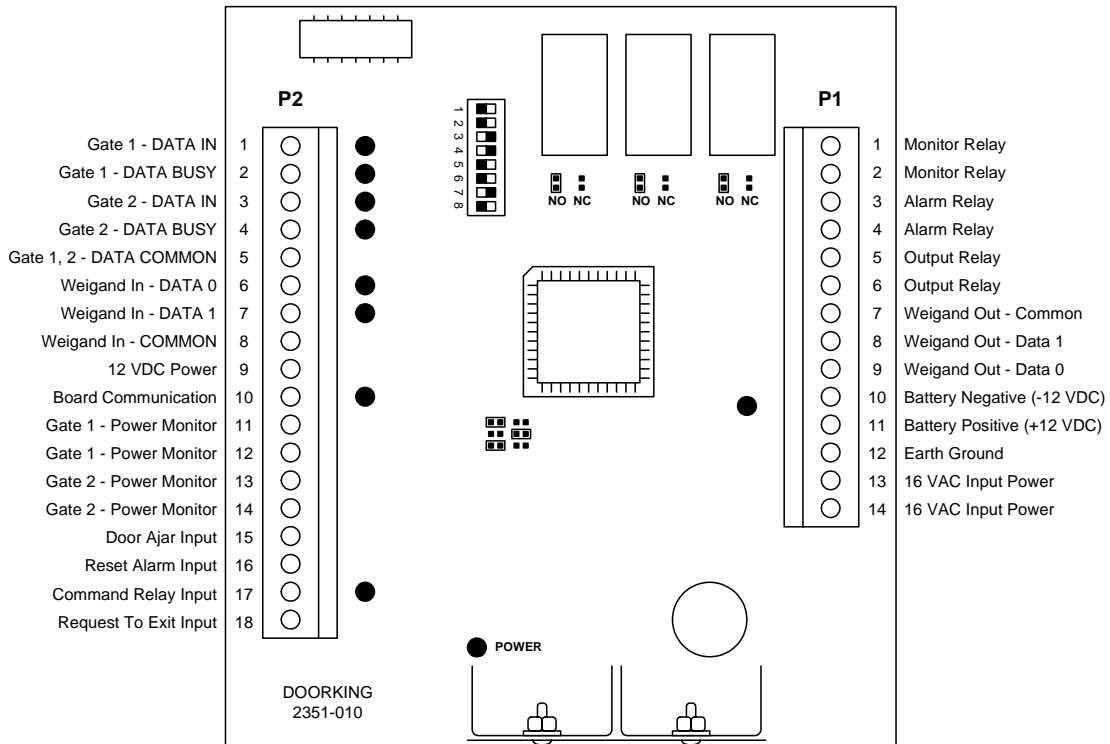
DOORKING, INC., INGLEWOOD, CA 90301		
Title: Board and Relay Identification for 30 Series Controller		
Date: 3/03	Dwg. No. M2351-065-15	Rev. A

1.5.3 Terminal Identification

TERMINAL P1		
1	Monitor Relay	
2	Monitor Relay	
3	Alarm Relay	
4	Alarm Relay	
5	Output Relay	
6	Output Relay	
7	Weigand Output – Common	Data output to 1803PC, 1815, 1817, 1818, 1833, 1835, 1837 or 1838 access control system.
8	Weigand Output – Data 1	
9	Weigand Output – Data 0	
10	Battery Negative (-12VDC)	Optional battery backup allows the tracker board to maintain operation during power out conditions. Use .8 amp gel cell, DoorKing P/N 1801-008 or equivalent.
11	Battery Positive (+12VDC)	
12	Earth Ground	
13	16 VAC Input Power	Use only supplied 16 VAC, 20 VA transformer (or U.L. listed equivalent) to power the tracker board. Max power wire run with 18 AWG wire is 100 feet; with 16 AWG wire 200 feet.
14	16 VAC Input Power	

TERMINAL P2		
1	Gate Operator 1 – Data IN	Gate operator data input from DoorKing slide or swing gate operators only.
2	Gate Operator 1 – Busy	
3	Gate Operator 2 – Data IN	Gate operator data input from DoorKing barrier gate operators only.
4	Gate Operator 2 – Busy	
5	Gate Operator 1 & 2 – Common	
6	Weigand Input – Data 0	26-bit weigand device input.
7	Weigand Input – Data 1	
8	Weigand Common	
9	12 VDC Weigand Device Power	
10	Tracker Board Busy	Communication to other Tracker boards.
11	Gate Operator 1 Power Monitor	Monitors 24 VAC power from slide or swing gate operator.
12	Gate Operator 1 Power Monitor	
13	Gate Operator 2 Power Monitor	Monitors 24 VAC power from barrier gate operator.
14	Gate Operator 2 Power Monitor	
15	Door Ajar Input	
16	Reset Alarm Input	
17	Command Relay Input	
18	Request To Exit input	

Terminal Identification



DOORKING, INC., INGLEWOOD, CA 90301

Title: 2351 Board Terminal Identification

Date: 4/02

Dwg. No. M2351-065-4

Rev. A

Section 2 - Installation

The location of the tracker board(s) is dependent on the application that it is being used. Tracker boards can be installed in selected card reader and digital keypad housings, or they can be installed in their own enclosure (enclosures are optional and not included with the Tracker board). DoorKing has two enclosures available for this purpose. The small housing will hold a single tracker board and the large housing can hold up to four tracker boards. In addition, the large housing has convenience outlets to power up to four accessory transformers.

The enclosure should be mounted in a location as close to the access system as possible. The maximum distance for tracker board wire runs is 500 feet.

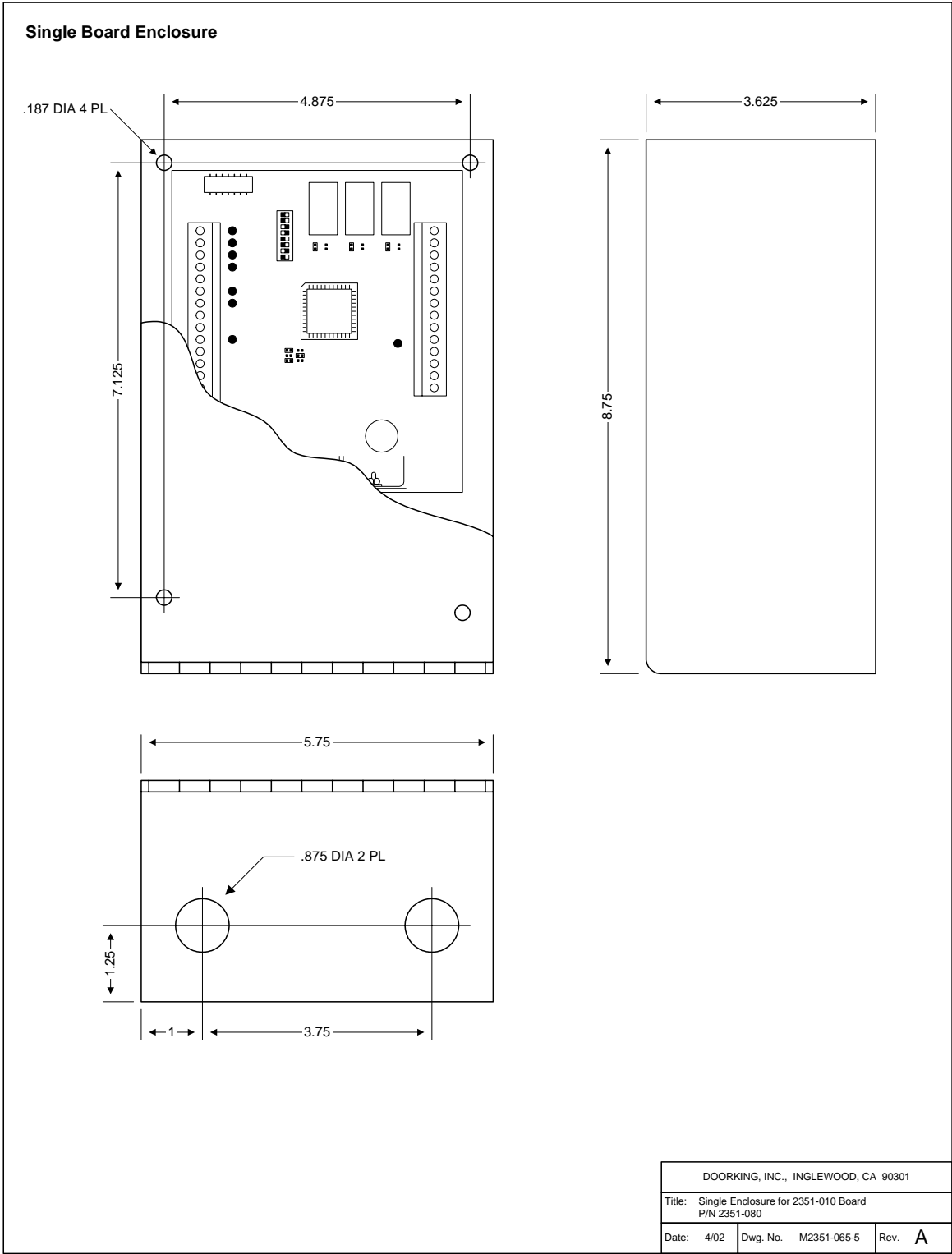
Selected models of proximity card readers are available with an enclosure that has ample room for a tracker board to be mounted inside the housing. This simplifies the installation of the card readers used with the tracker board. A typical application for this would be a controlled access apartment complex or gated community that requires card access for the pedestrian gate, pool gate, laundry room, exercise room, etc. Each of these locations can be card controlled by the access control system using tracker expansion boards to control each entry point. Each tracker board in this example is a part of the card reader itself and requires no other external enclosure.



WARNING! If a card reader/tracker board combination is used to control a vehicular gate with an automatic gate operator, the card reader must be mounted a minimum of ten (10) feet away from the gate and gate operator, or in such a way that a person cannot operate the card reader and touch the gate or gate operator at the same time.

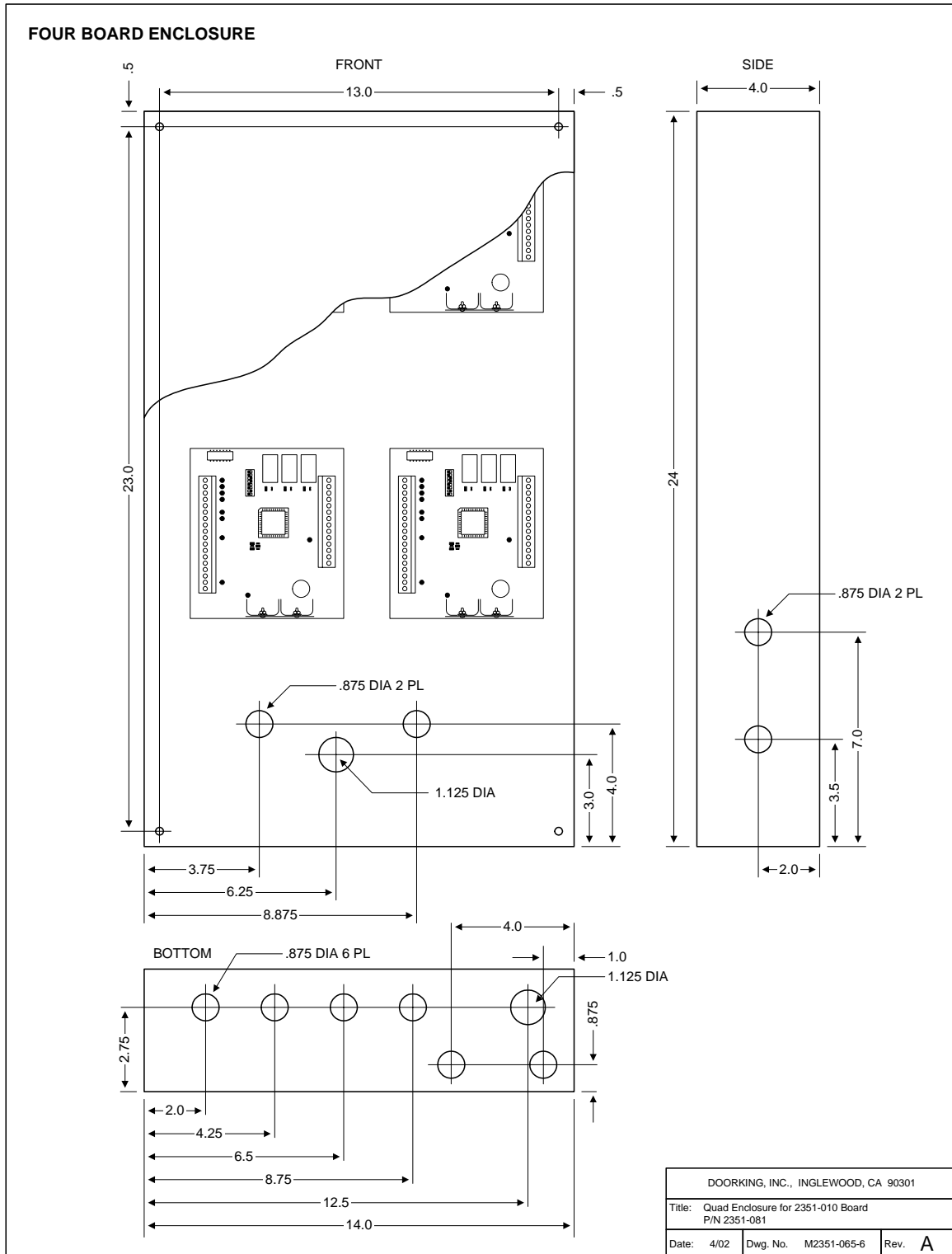
2.1 Single Housing

- P/N 2351-080 provides a lockable, weather resistant housing for a single tracker board.



2.2 Quad Housing

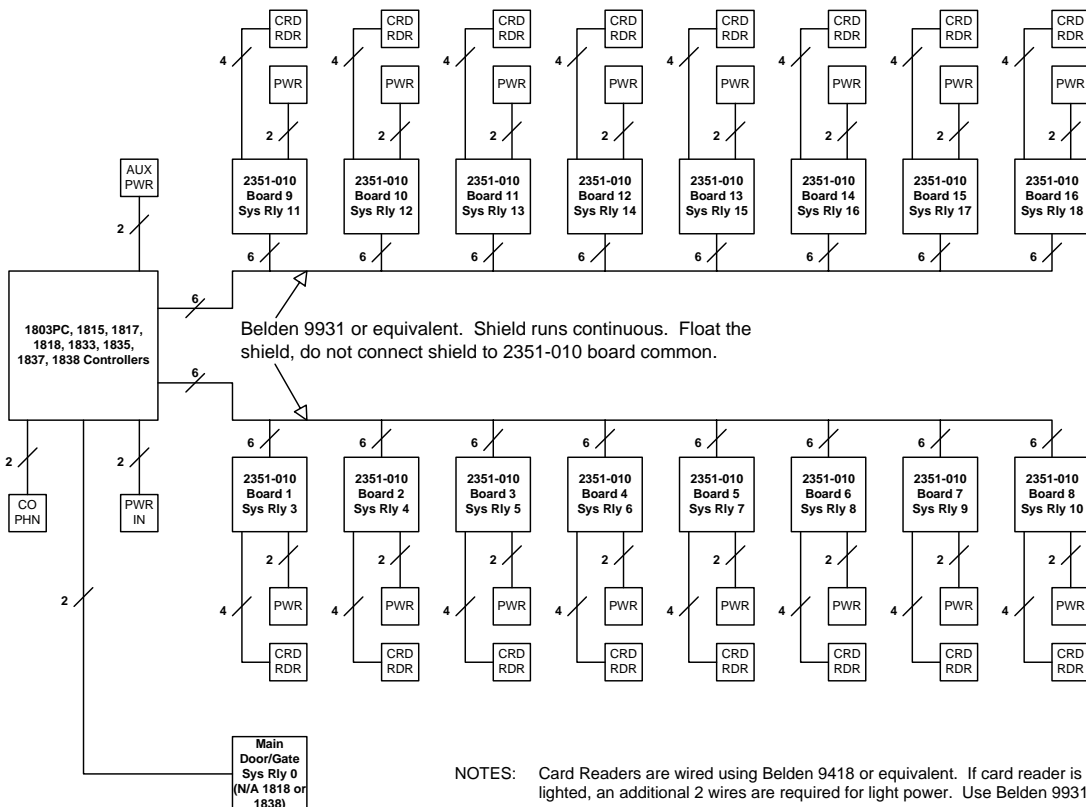
- P/N 2351-081 provides a lockable weather resistant housing for up to four (4) tracker boards. Includes terminal strips and four (4) convenience outlets for power transformers.



Section 3 – Wiring Information

Plan your wire runs before starting the installation. Use proper wire for the weigand lines, power wires, and be sure that the system is properly grounded. Check all local building ordinances and building codes prior to installing this system. Be sure your installation is in compliance with local codes.

**Controller to 2351-010 Expansion Board
Block Diagram**



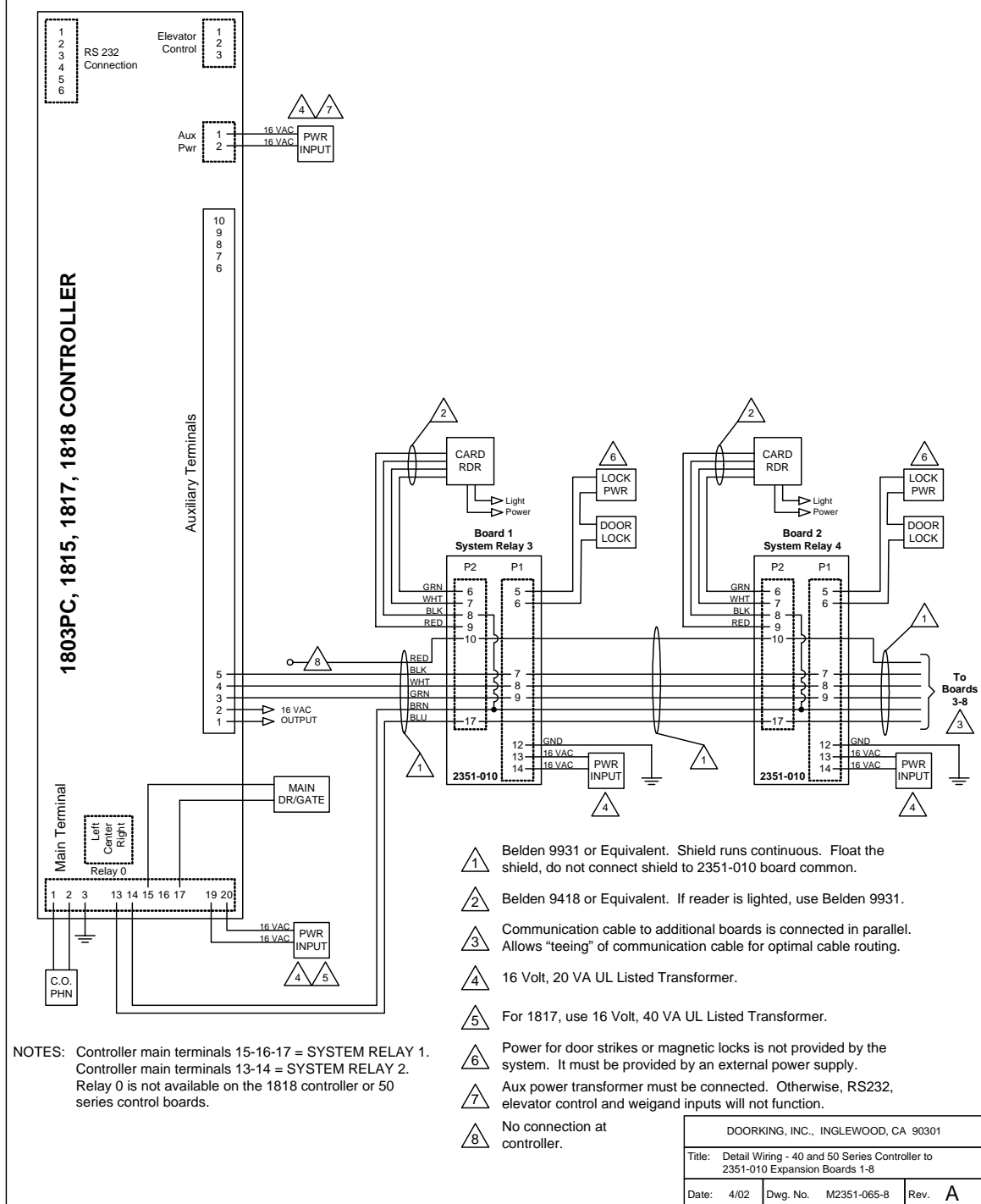
- NOTES:**
- Card Readers are wired using Belden 9418 or equivalent. If card reader is lighted, an additional 2 wires are required for light power. Use Belden 9931.
 - Power supplies use minimum 18 GA. Wire.
 - Ground all circuit boards.
 - Controller main terminals 15-16-17 = System Relay 1.
 - Controller main terminals 13-14 = System Relay 2.
 - Relay 0 is used when system expands to 9 2351-010 boards or more, otherwise system relay 1 is used for main door/gate control.
 - Relay 0 is not available on the 1818 or 1837 controller.

DOORKING, INC., INGLEWOOD, CA 90301		
Title: Block Diagram - Controller to 2351-010 Expansion Boards		
Date: 3/03	Dwg. No. M2351-065-7	Rev. B

3.1 Tracker Boards 1-8 Detail Wiring for 40 and 50 Series Boards

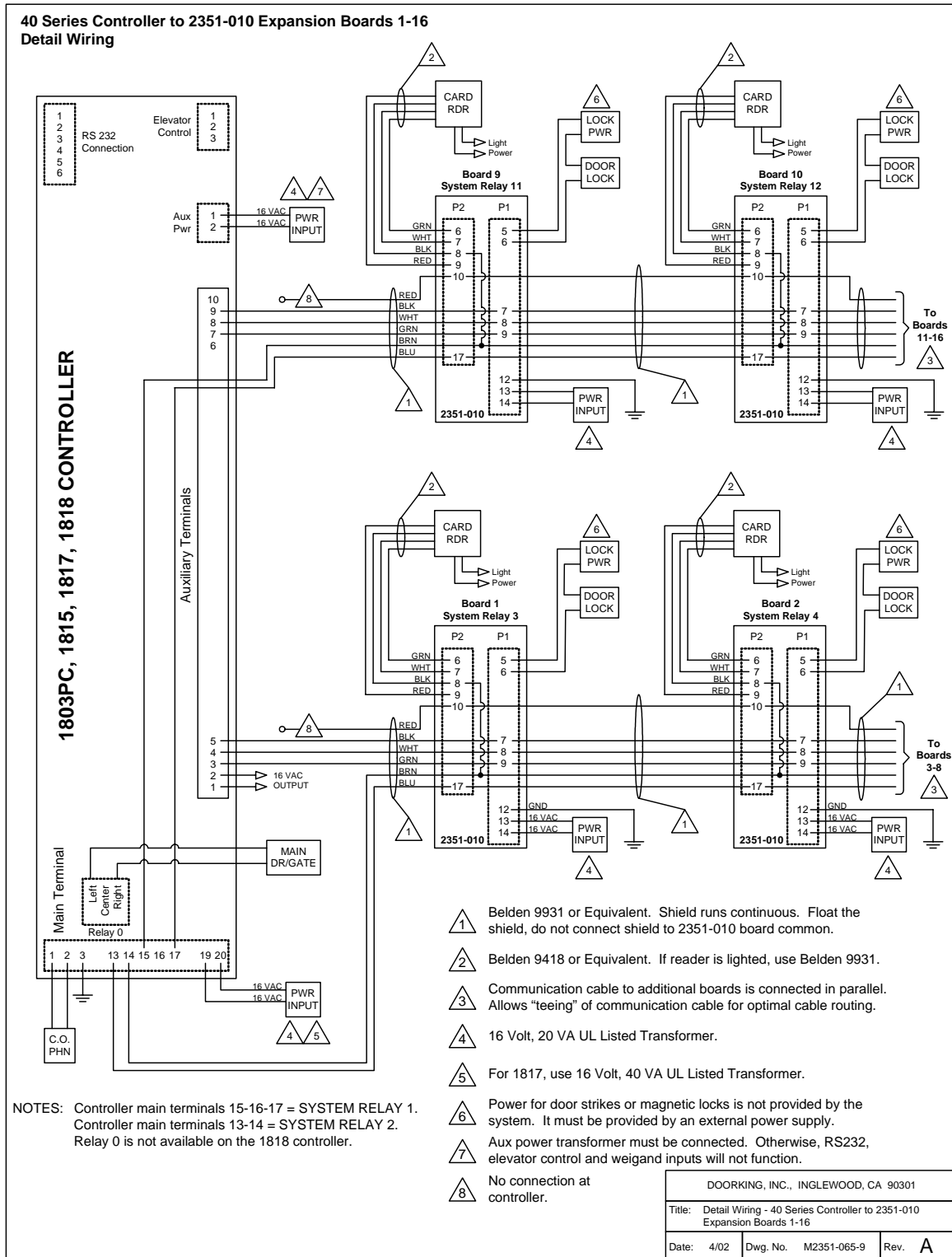
- Maximum wire run between Tracker boards 1-8 is 500 feet total.
- Do not use twisted pair wire with weigand output format.
- Proper grounding is required! Ground wire should be a minimum 12 AWG.

**40 and 50 Series Controller to 2351-010 Expansion Boards 1-8
Detail Wiring**



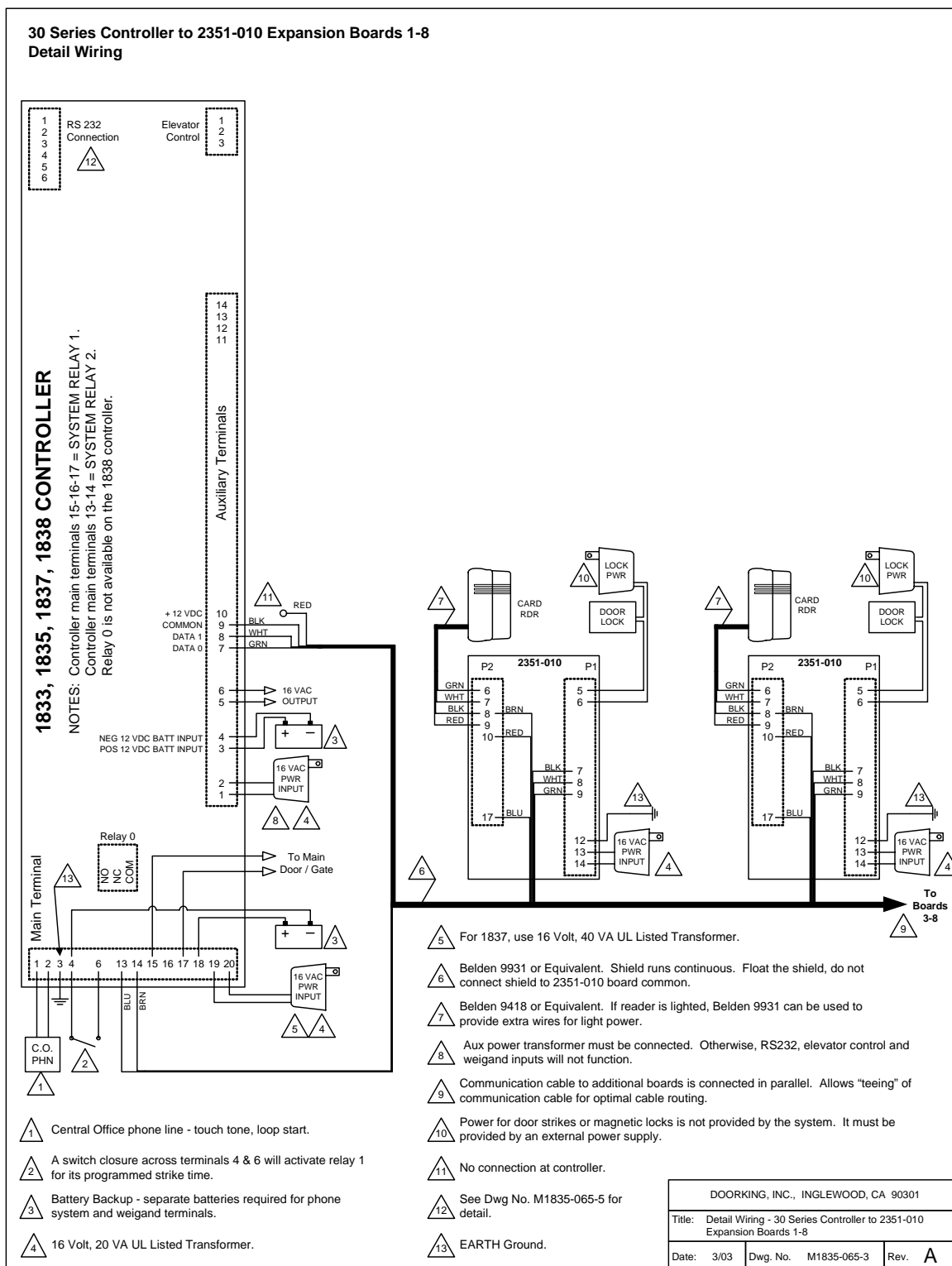
3.2 Tracker Boards 9-16 Detail Wiring for 40 Series Boards

- Maximum wire run between Tracker boards 9-16 is 500 feet total.
- Do not use twisted pair wire with weigand output format.
- Proper grounding is required! Ground wire should be a minimum 12 AWG.



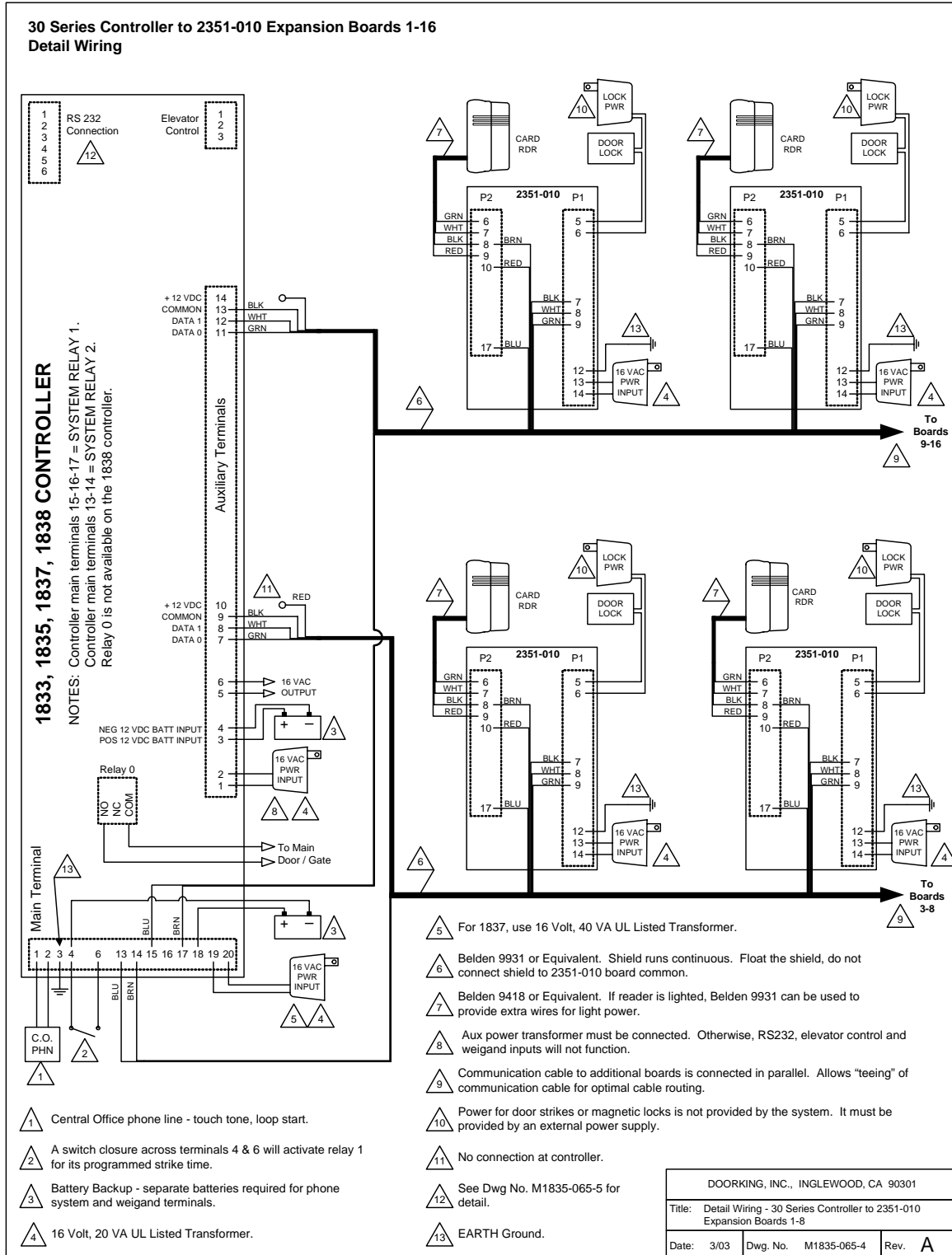
3.3 Tracker Boards 1-8 Detail Wiring for 30 Series Boards

- Maximum wire run between Tracker boards 1-8 is 500 feet total.
- Do not use twisted pair wire with weigand output format.
- Proper grounding is required! Ground wire should be a minimum 12 AWG.



3.4 Tracker Boards 9-16 Detail Wiring for 30 Series Boards

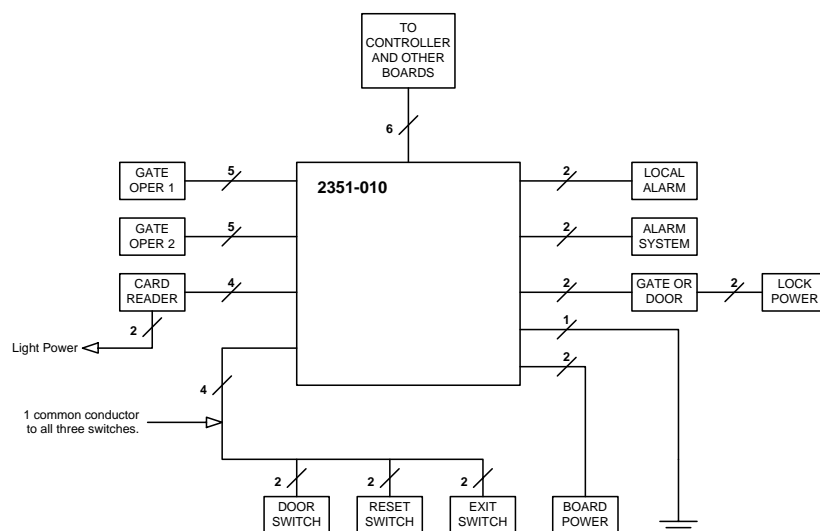
- Maximum wire run between Tracker boards 9-16 is 500 feet total.
- Do not use twisted pair wire with weigand output format.
- Proper grounding is required! Ground wire should be a minimum 12 AWG



3.5 Block Diagram Single Door – Typical

- The block diagram below shows the necessary wire runs needed when all options (gate operator data, alarm outputs, door and reset switches, request to exit, etc.) available with the 2351 Tracker board are utilized.

BLOCK DIAGRAM - 2351 BOARD



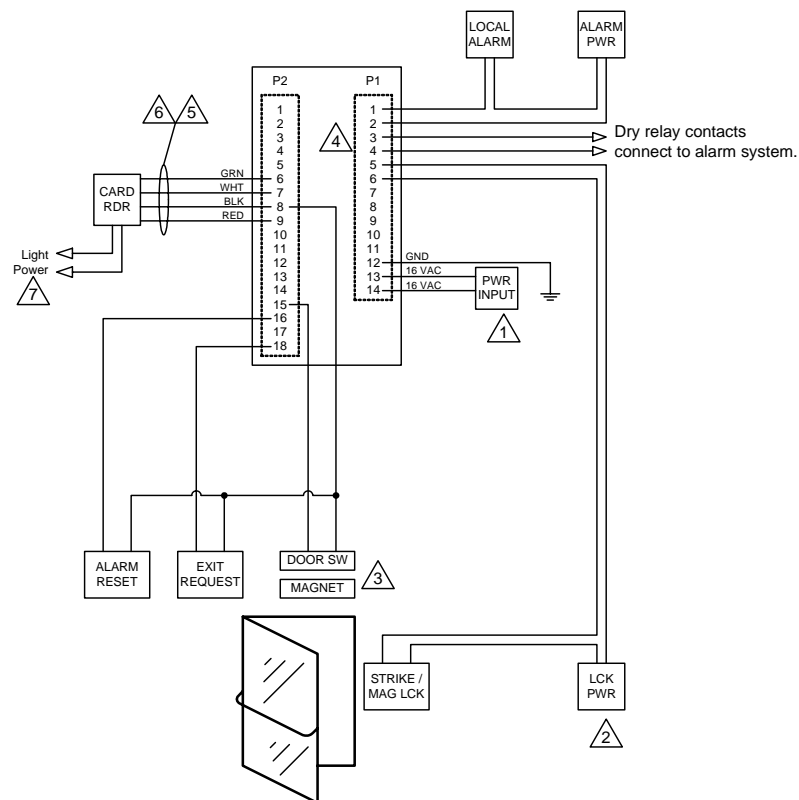
NOTES: Card Reader is wired using Belden 9418 or equivalent. If card reader is lighted, two additional conductors are required for light power.
 Card Reader can be substituted with most devices that output data in 26-bit weigand format.
 Power supply uses minimum 18 GA. Wire.
 Ground circuit board. Use 12 GA. Wire.
 Gate operator inputs are for operator data only.
 Gate operator input 1 from DKS slide, swing or overhead operators only.
 Gate operator input 2 from DKS barrier gate operators only.
 Local alarm and alarm system outputs are dry relay contacts.

DOORKING, INC., INGLEWOOD, CA 90301		
Title: Block Diagram - 2351-010 Expansion Board		
Date: 4/02	Dwg. No. M2351-065-10	Rev. A

3.6 Door Control Wiring Detail - Typical

- Set output relay shorting bar on the Tracker board to N.O. (Normally Open) when using fail-secure (electric strikes) locking devices; set to N.C. (Normally Closed) when using fail-safe (magnetic locks) locking devices.

**2351-010 Expansion Board Door Control
Detail Wiring**



- 1 16 Volt, 20 VA UL Listed.
- 2 Power for door strikes or magnetic lock is not provided by the system. It must be provided by an external power supply.
- 3 Switch is wired N.C. (Normally Closed).
- 4 Relay contacts (1-2; 3-4; 5-6) are rated at 5A 250V maximum and can be set for Normally Open (N.O.) or Normally Closed (N.C.) operation.
- 5 Belden 9418 or equivalent.
- 6 Green = Data 0
White = Data 1
Black = Common
Red = 12 VDC Power
- 7 If card reader is lighted, separate light power must be provided.

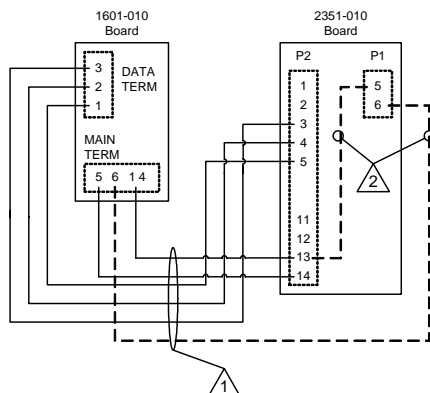
NOTE: Wiring to controller/other tracker boards is not shown.

DOORKING, INC., INGLEWOOD, CA 90301		
Title: Detail Wiring - 2351-010 Expansion Board Door Control		
Date: 3/03	Dwg. No. M2351-065-11	Rev. B

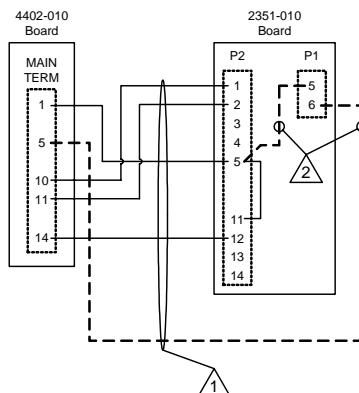
3.7 Gate Operator Data

- Each tracker board can report data to the access control system from two (2) DKS gate operators; a slide or swing gate operator and a barrier gate operator. See page 32 for a list of the events that can be reported.

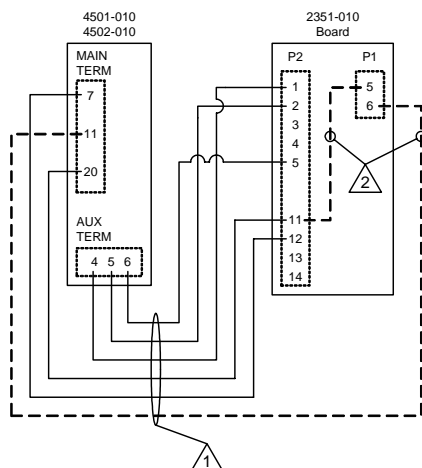
Models 1601, 1602
Circuit Board 1601-010



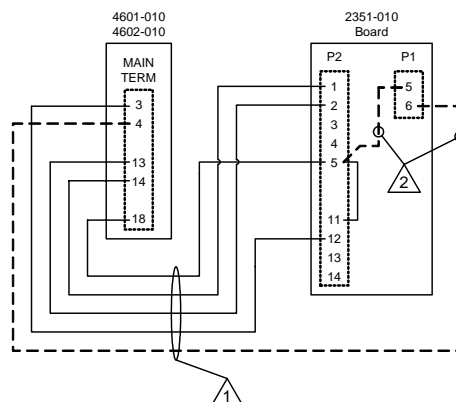
Models 1150, 9200, 9300
Circuit Board 4402-010



Models 600 and 6000 Series Swing Gates
Circuit Boards 4501-010, 4502-010



Models 910, 915, 920, 9100, 9150 Slide Gates
Circuit Boards 4601-010, 4602-010



1 Belden 9931 or Equivalent.

2 Wiring indicated by dashed (---) lines is required only if the 2351-010 board is to command open the vehicular gate when a valid access code has been received.

NOTE:

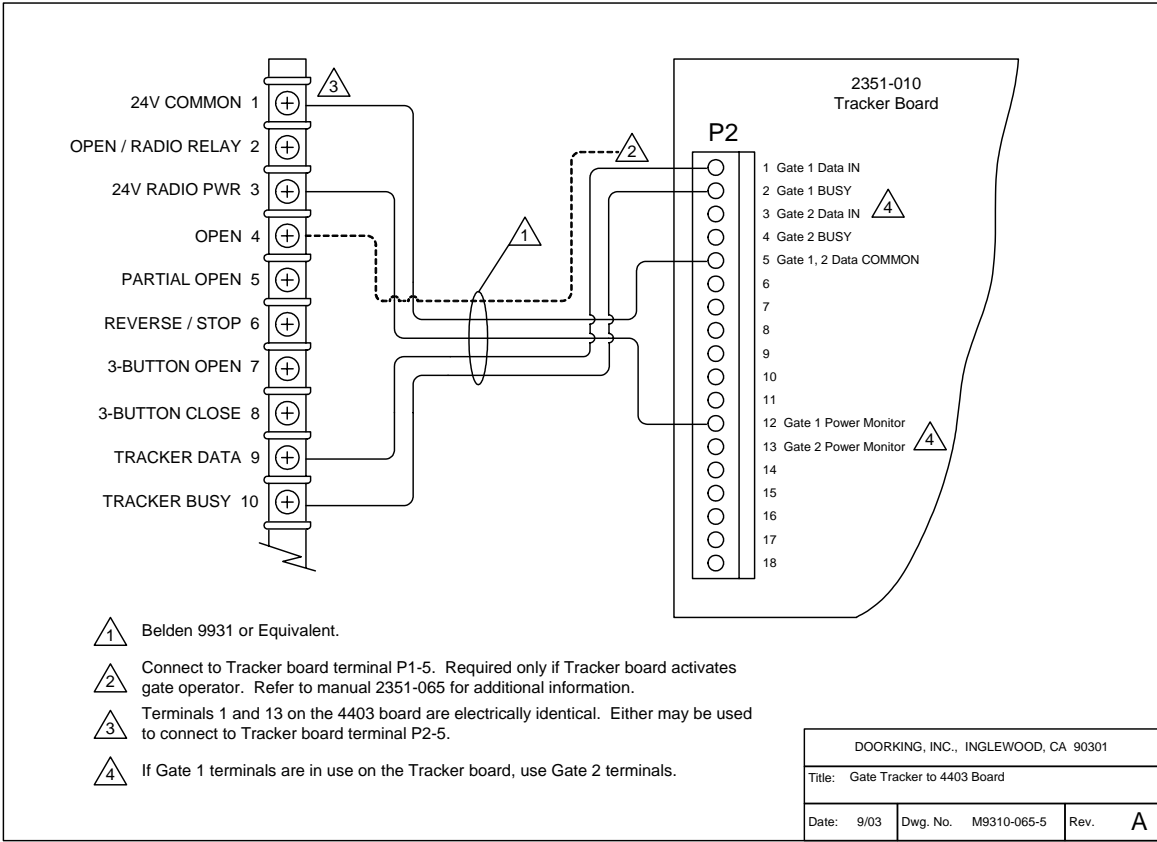
Wiring show is for the connection of DKS vehicular gate operators only to the 2351-010 board to record gate operator data.

DOORKING, INC., INGLEWOOD, CA

Title: Detail Wiring - 2351-010 Expansion Board
DKS Gate Operators

Date: 10/03 Dwg. No. M2351-065-12 Rev. **B**

Wiring for 9310 Gate Operator Only



3.8 General Wiring Information

The wiring of the tracker board(s) is an extremely important and integral part of the overall access control system. Use proper wire for weigand and power wire runs, and be sure that the system is properly grounded. Check all local building ordinances and building codes prior to installing the system. Be sure that your installation is in compliance with these codes.

- Use only the supplied power transformers (16 VAC, 20 VA) or U.L. listed equivalent to power the tracker board. You may power up to four (4) tracker boards from a single 16 VAC, 40 VA power transformer.
- Use 18 AWG wire for power wire runs up to 100 feet. Use 16 AWG wire for power wire runs up to 200 feet. It is advisable to keep power wire runs as short as possible.
- Do not power any other devices (electric strikes, magnetic locks) from the tracker board power transformer. These devices must be powered from their own power supply.
- Proper grounding of the system is required. To be effective, ground connections should be made with a minimum 12 AWG wire with a ground point within 10-feet of the access control system. The ground point must be an electrical panel ground buss, a metallic cold water pipe that runs in the earth, or a grounding rod driven at least 10-feet into the soil. If there are several components in the access control system within close proximity to each other, you should consider using a single-point ground system. Check with your building department for specific grounding guidelines as soil conditions and grounding requirements differ depending on your geographical location.
- Surge suppressers can significantly reduce the chance of component failure because of static charges or surges. We recommend using both high and low voltage surge suppressers to help protect equipment from damage. High voltage suppresser P/N 1876-010; low voltage suppresser P/N 1878-010.
- A 12 VDC, 3 amp-hour battery (P/N 1801-009) can be used to supply backup power to four (4) tracker boards. Use a 12 VDC, .8 amp-hour battery (P/N 1801-007) to backup a single tracker board. Battery backup power is optional and not required for normal tracker board operation.
- Be sure to color code all wires.



WARNING! If the access control system is used to control a vehicular gate with an automatic gate operator, the access control device must be mounted a minimum of ten (10) feet away from the gate and gate operator, or in such a way that a person cannot operate the access control device and touch the gate or gate operator at the same time.

Section 4 – Trouble Shooting

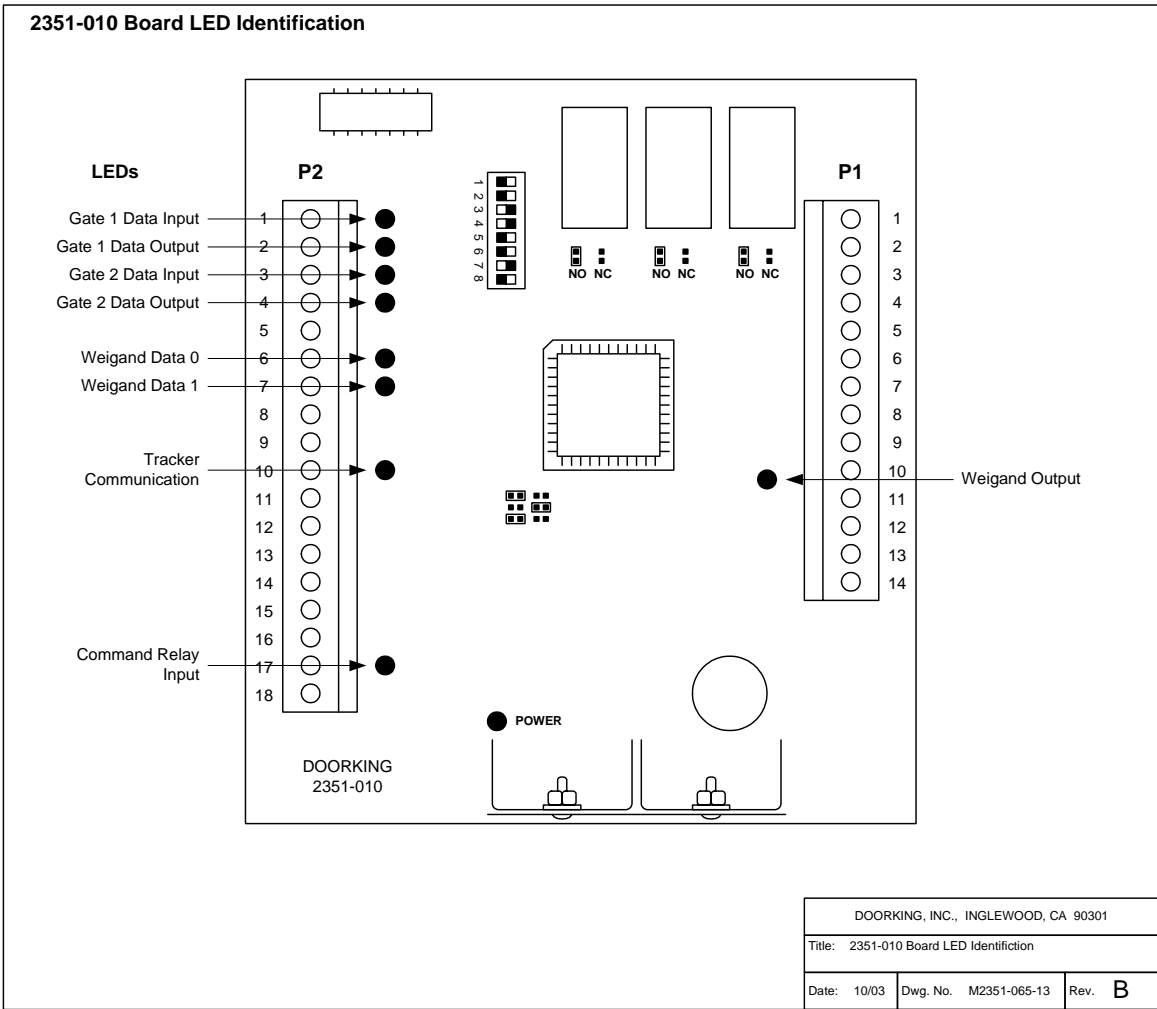
Before beginning any trouble shooting, check all wiring and look for any loose connections. Double check your wiring! The tracker expansion board in some applications may have over 20 wires connected directly to the board terminal strips. Be sure that you have a good VOM (Volt-Ohm-Meter) to assist you when checking voltages and continuity.

Check the programming switches to be sure that the tracker board is setup to operate as desired. If more that one tracker board is connected in the system, be sure the board jumpers are set correctly.

Be sure that the tracker board is powered (16 VAC). The POWER led should be ON when power is applied to the tracker board. A backup battery should be connected to the tracker board as described in section 4.2.

4.1 LED Identification

The illustration below identifies the terminals and LEDs that are useful for trouble shooting purposes.



4.2 Weigand Device Data

The weigand device (card reader, RF receiver, digital, etc.) must output data in the 26-bit weigand format. The tracker board is not capable of receiving any other weigand format from these devices.

The weigand device must be connected to terminal P2, pins 6-7-8-9 as described in section 4.4 of this manual.

Two weigand devices may be connected in parallel to the weigand input on the tracker board. Be aware that both devices will appear to the access system and the Remote Account Manager software as the same device.

Power for the weigand devices is provided on terminal P2, pins 8 (common) and 9 (+10 to +12 VDC). To check this power:

1. Set your VOM to the 50-volt DC range.
2. Connect the positive lead (red) to pin 9 and the negative lead (black) to pin 8. The meter should indicate +10 to +12 volts DC.

The tracker board weigands out data on terminal P1 pins 7-8-9. When the tracker board is sending data to the access system on these lines, the LED near these terminals will light. The voltage to operate these terminals comes from the access system. Normal voltage on these terminals is +4.5 to +5 volts DC. To check this voltage:

1. Set your VOM to the 50-volt DC range.
2. Connect the negative (black) lead to pin 7 and then check pins 8 and 9 with the positive (red) lead. The meter should indicate +4.5 to +5 volts DC.

The data from the weigand devices is inputted to the tracker board on terminal P2, pins 6 and 7. The normal voltage for these pins is +4.5 to + 5 volts DC. This can be checked by connecting the negative (black) lead of your meter to pin 8 and then checking for voltage with the positive (red) lead on pins 6 and 7.

When a weigand device sends data to the tracker board on terminal P2, pins 6 and 7, the LED's associated with these terminals will flash. These flashes are very fast and may be difficult to see. If a 26-bit weigand input is received, the tracker board makes the lines on terminal P2, pins 2 and 4 busy to prevent the gate operators from sending any transactions. It then checks for a busy signal on terminal P2, pin 10. If this pin is not busy, the tracker board will make this pin busy itself and then weigand out the data to the access system (If P2, pin 10 is busy, the tracker board simply waits for this pin to go un-busy and then sends the data). After the tracker board sends the data, it will wait for a reply from the access system (The weigand out LED will flash when the data is sent to the access system). Once the data is received by the access system, the access system will make the decision to grant or deny access. If the decision is to deny access, the tracker board will release the busy signal on terminal P2 pin 10, and will not activate it's output relay. If the decision is to grant access, the access system will activate its relay, which causes the tracker board to activate its output relay, and then releases the busy signal on terminal P2 pin 10 allowing other tracker boards to communicate with the access system.

The above operating sequence takes place in less than one second. In applications where the system is operating at its maximum (16 devices), and in the unlikely event that all devices are activated at precisely the same moment in time, there could be a delay of a few seconds for the last tracker board to activate its output relay if the access system decides to grant access to the person using the device connected to this tracker board.

4.3 Gate Operator Data

Be sure that the gate operator has Gate Tracker capability. This can be determined by checking the revision letter of the control board in the operator. Gate operator control boards with Gate Tracker capability are listed below.

- 4402 Rev A or higher.
- 4403 Rev A or higher.
- 4501 Rev R or higher; 4502 Rev A or higher.
- 4601 Rev J or higher; 4602 Rev A or higher.
- 1601 Rev Q or higher.

If the control board that you are working with has a lower revision letter than those listed above, the control board does not have the capability to send operator data to the tracker board.

The Gate Tracker outputs from the 4402, 4403, 4501, 4502, 4601 and 4602 control boards must be wired to tracker board terminal P2, pins 1-2-5. Gate Tracker outputs from the 1601 control board must be wired to tracker board terminal P2, pins 3-4-5

Normal voltage at terminal P2, pins 1-2-3-4 is -8 to -12 VDC. To check this:

1. Set your VOM to the 50-volt DC range.
2. Connect the positive lead (red) to pin 5, then touch the negative lead (black) to pins 1-2-3-4. Each should indicate 8 to 12 volts on your meter. Note: the meter reading is actually a negative voltage because the positive lead of your meter is connected to a common point (pin 5). If you reverse the meter leads, the needle should move off scale to the left indicating a negative voltage.
3. As the tracker board is receiving data from the gate operator on pins 1 or 3, the LED's associated with these terminals will light and the voltage on pins 1 or 3 will go positive. Note: the transfer of data from the gate operator to the tracker board is extremely fast. It may be difficult to see the LED's light and unless you have a very good digital type meter, measuring the voltage change from negative to positive will be very difficult.
4. The tracker board will send a busy signal back to the gate operator on pins 2 or 4. When this happens, the LED's associated with these terminals will light and the voltage on pins 2 or 4 will go positive. Note: the busy signal from the tracker board to the gate operator is extremely fast. It may be difficult to see the LED's light and unless you have a very good digital type meter, measuring the voltage change from negative to positive will be very difficult.
5. After the tracker board has received the data from the gate operator, it will send the data to the access system. When this happens, the weigand output LED will light, and the tracker board busy LED will light. After the data has been sent, these LED's will go off.
6. The tracker board cannot receive any data if the busy LED (P2-10) is lighted.

Gate Operator Event (transaction) Reports

The tracker interface board sends the following gate operator data to the DKS access control system. This data is stored in a separate file in the access system and can be viewed by clicking the GATE button on the transaction report screen in the DoorKing Remote Account Manager for Windows software. Each event is date and time stamped.

Event (transaction)	Description
Gate Operate 100 Times	Transaction sent each time gate operator goes through 100 operations. If 10 of these transactions show on report, the operator has cycled 1000 (10 x 100) times.
Gate Forced	An attempt was made to force open the gate.
Gate Hit Obstruction	The Type A (inherent) entrapment prevention device was activated.
Gate Power On	Power applied to the operator control board.
Gate Key 1 On 5 Minutes	Input is activated continuously (shorted) for at least 5-minutes.
Gate Key 2 On 5 Minutes	Input is activated continuously (shorted) for at least 5-minutes.
Gate Reverse On 5 Minutes	Reverse input is activated continuously (shorted) for at least 5-minutes.
Gate 5/14 On 5 Minutes	Partial open input is activated continuously (shorted) for at least 5-minutes.
Gate Input On 5 Minutes Rels	Shorted input has been cleared.
Gate Stop On 5 Minutes	Stop (3-button) input is activated continuously (shorted) for at least 5-minutes.
Gate Reverse Loop On 5 Minutes	Detector plugged into control board reverse port activated at least 5-minutes.
Gate Exit Loop On 5 Minutes	Detector plugged into control board open port activated at least 5-minutes.
1601 Up On 5 Minutes	Up input to 1601/1602 operator activated continuously for at least 5-minutes.
1601 Down On 5 Minutes	Down input to 1601/1602 operator activated continuously for at least 5-minutes.
1601 Up Loop On 5 Minutes	Detector plugged into control board up port activated at least 5-minutes.
1601 Up Loop Down 5 Minutes	Detector plugged into control board down port activated at least 5-minutes.
1601 Power On	Power applied to the operator control board.
1601 Input On 5 Minutes Rels	Shorted input has been cleared.
Pedestrian Gate Stuck Open	Alarm relay activated on 2351 board.
Pedestrian Gate Closed	Alarm reset activated on 2351 board.
1601 Hit Obstruction	The Type A (inherent) entrapment prevention device was activated.
Gate Open On 5 Minutes	Open (3-button) input is activated continuously (shorted) for at least 5-minutes.
Gate Close On 5 Minutes	Close (3-button) input is activated continuously (shorted) for at least 5-minutes.
Gate 1 Power Off	Power applied to the operator control board has been lost.
1601 Power Off	Power applied to the operator control board has been lost.
Open Beam On 5 Minutes	Input is activated continuously (shorted) for at least 5-minutes.
Close Beam On 5 Minutes	Input is activated continuously (shorted) for at least 5-minutes.
Open Edge Activated	Reverse edge has been activated.
Close Edge Activated	Reverse edge has been activated.
Gate Shut Down	Slide gate hard shutdown, entrapment alarm activated.
Reset Pushed	Slide gate reset button activated.
Alarm On	Swing gate hard shutdown, entrapment alarm activated.
Reset Pushed	Swing gate reset button activated.
Beam On 5 Minutes	Swing gate beam input is activated continuously (shorted) for at least 5-minutes.

